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10/673,514	09/30/2003	Hideaki Miyoshi	243294US6YA	1592

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EXAMINER

ARANCIBIA, MAUREEN GRAMAGLIA

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/673,514

Applicant(s)

MIYOSHI ET AL.

Examiner

Maureen G. Arancibia

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 25 May 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) 20-49 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election with traverse of the invention of Group I, Claims 1-19 in the reply filed on 25 May 2005 is acknowledged. The traversal is on the ground(s) that a search and examination of the entire application would not place a serious burden on the Examiner, since the claims in each group seem to be part of an overlapping search area. This is not found persuasive because even if the search areas for each group happened to overlap, there is no reason to expect that the search areas would be *coextensive*.

The requirement is still deemed proper and is therefore made **FINAL**.

2. Claims 20-49 withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 25 May 2005.

### ***Drawings***

3. The drawings are objected to because in Figure 3, the words "INITIALIZING", "PROVIDING", and "BEING" are misspelled in boxes 330, 340, and 350. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be

canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

#### ***Specification***

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: the Examiner was unable to identify support in the Specification for the subject matter recited Claim 18, specifically that the first matching network is tuned from the initial condition to the operating condition *in less than 4 seconds*.

#### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

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applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**6. Claims 1-8, 11, and 13-19 are rejected under 35 U.S.C. 102(a) and 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application Publication 2003/0151372 to Tsuchiya et al.**

Tsuchiya et al. teaches a method of operating a plasma processing system, comprising: positioning a substrate 9 on a substrate holder 5 in a processing chamber 1; initializing the plasma processing system; igniting a plasma using a first signal at a first RF frequency, wherein a first frequency source 4 is coupled to an electrode 3 in the processing chamber; and sustaining the plasma using a second signal at a second RF frequency. (Paragraph 67)

In regards to Claims 2 and 3, the first signal is set to a first output power level of 500 W to 10 kW. (Paragraph 51)

In regards to Claim 4, the process gas comprises a carbon- and fluorine-containing gas (CF<sub>4</sub>). (Paragraph 68) The pressure is established at about 30 mTorr (4 Pa) (Paragraph 92)

In regards to Claim 5, Tsuchiya et al. teaches coupling the first frequency source 4 to the electrode 3 using a first matching network 41, and tuning the first matching network to an initial condition for plasma ignition. (Paragraphs 89 and 91)

In regards to Claims 6-8, the first RF frequency can be 60 MHz, which is more than 10% higher in frequency than the second RF frequency of 13.56 MHz. (Paragraph 51)

In regards to Claim 11, Tsuchiya et al. teaches that the first signal is provided for a first time period, and the second signal is provided for a second time period. (i.e. each from a defined start time to an end time; Paragraphs 57 and 69)

In regards to Claims 13 and 14, Tsuchiya et al. teaches that the method can further comprise: determining a forward power for the first signal being provided by the first frequency source; determining a reflected power for the first signal being returned to the first frequency source; and determining when the plasma has been ignited using the forward power and the reflected power. (Paragraphs 61-64 and 108)

In regards to Claims 15 and 16, Tsuchiya et al. teaches that the ignition and maintenance of the plasma are determined using at least one optical frequency obtained by an optical frequency monitoring system coupled to the processing chamber. (Paragraphs 73, 78, 79, 82)

In regards to Claim 17, Tsuchiya et al. teaches tuning the first matching network from the initial condition to an operating condition, and verifying that the plasma has not extinguished. (Paragraphs 90-97)

In regards to Claim 18, Tsuchiya et al. teaches that the first matching network is tuned from the initial condition to the operating condition in less than 4 seconds (about 1 second). (Paragraphs 117 and 121)

In regards to Claim 19, Tsuchiya et al. teaches that the method further comprises coupling a second RF source 50 to second electrode (and substrate support) 5; and providing additional power to the plasma. (Paragraphs 56 and 57)

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. **Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuchiya et al. in view of Japanese Patent Application Publication 08-031753 to Tashiro et al. The following rejection refers to the English Machine Translation (EMT) of Tashiro et al.**

The teachings of Tsuchiya et al. were discussed above.

In regards to Claims 9 and 10, Tsuchiya et al. does not expressly teach that the first RF frequency can be 10% lower in frequency than the second RF frequency.

Tashiro et al. teaches that a first RF frequency can be 13.56 MHz, which is more than 10% lower than a second RF frequency of 30-300 MHz. (EMT, Paragraphs 26 and 27)

It would have been obvious to one of ordinary skill in the art to modify the method taught by Tsuchiya et al. to have the first RF frequency be more than 10% lower than the second RF frequency. The motivation for making such a modification, as taught by Tashiro et al. (Paragraphs 26 and 27), would have been to easily and quickly generate and stabilize the plasma.

9. **Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuchiya et al. in view of U.S. Patent 5,441,596 to Nulty.**

The teachings of Tsuchiya et al. were discussed above in regards to Claim 11.

In regards to Claim 12, Tsuchiya et al. does not expressly teach that the first time period has a duration that ranged from about 10 ms to about 1 s.

Nulty teaches that a first RF signal can be applied for a time period of 1 s.  
(Column 4, Lines 1-16)

It would have been obvious to one of ordinary skill in the art to modify the method taught by Tsuchiya et al. to have the first time period be only 1 s long; i.e. to end the application of the first RF signal before the end of the plasma processing. The motivation for making such a modification, as taught by Nulty (Column 2, Lines 37-45, Column 4, Lines 1-16, Column 6, Lines 47-56), would have been to consistently, repeatably ignite the plasma while still expanding the operating range of the plasma process to higher powers and lower pressures.

### ***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 5882,424 to Taylor et al. teaches supplying two different RF signals to electrode 18.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone



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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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